NIKO-SEM

N-Channel Enhancement Mode Field Effect Transistor

PE616BA
PDFN 3x3P
Halogen-Free & Lead-Free

RoHS Compliant

PRODUCT SUMMARY

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
30V	7mΩ	36A

D

G

S

D D D D

#1 S S S G

G. GATE
D. DRAIN
S. SOURCE
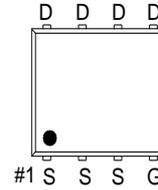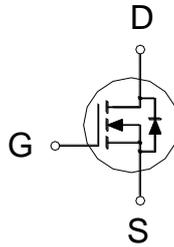
ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25 °C	I_D	36	A
	T_C = 100 °C		23	
Pulsed Drain Current[1]		I_{DM}	100	
Continuous Drain Current	T_A = 25 °C	I_D	12	
	T_A = 70 °C		9.2	
Avalanche Current		I_{AS}	23	
Avalanche Energy	L = 0.1mH	E_{AS}	26.4	mJ
Power Dissipation	T_C = 25 °C	P_D	16.7	W
	T_C = 100 °C		6.7	
Power Dissipation	T_A = 25 °C	P_D	1.7	W
	T_A = 70 °C		1	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient[2]	$R_{\theta JA}$		75	°C / W
Junction-to-Case	$R_{\theta JC}$		7	

[1]Pulse width limited by maximum junction temperature.
[2]The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.

ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

| PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250µA	30			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	1.35	1.8	3	

Gate-Body Leakage	I_{GSS}		$V_{DS} = 0V$, $V_{GS} = \pm 20V$				± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}		$V_{DS} = 24V$, $V_{GS} = 0V$				1	μA
			$V_{DS} = 20V$, $V_{GS} = 0V$, $T_J = 55\ °C$				10	
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$		$V_{GS} = 4.5V$, $I_D = 12A$			7	9.5	$m\Omega$
			$V_{GS} = 10V$, $I_D = 12A$			5.4	7	
Forward Transconductance[1]	g_{fs}		$V_{DS} = 5V$, $I_D = 12A$			55		S
DYNAMIC								
Input Capacitance	C_{iss}		$V_{GS} = 0V$, $V_{DS} = 15V$, $f = 1MHz$			835		pF
Output Capacitance	C_{oss}					158		
Reverse Transfer Capacitance	C_{rss}					96		
Gate Resistance	R_g		$V_{GS} = 0V$, $V_{DS} = 0V$, $f = 1MHz$			2.4		Ω
Total Gate Charge[2]	Q_g	$V_{GS} = 10V$	$V_{DS} = 15V$, $I_D = 12A$			17.7		nC
		$V_{GS} = 4.5V$				9.5		
Gate-Source Charge[2]	Q_{gs}					2.3		
Gate-Drain Charge[2]	Q_{gd}					5.1		
Turn-On Delay Time[2]	$t_{d(on)}$		$V_{DS} = 15V$, $I_D \cong 12A$, $V_{GS} = 10V$, $R_{GEN} = 6\Omega$			27		nS
Rise Time[2]	t_r					23		
Turn-Off Delay Time[2]	$t_{d(off)}$					51		
Fall Time[2]	t_f					24		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)								
Continuous Current	I_S						14	A
Forward Voltage[1]	V_{SD}		$I_F = 12A$, $V_{GS} = 0V$				1.2	V
Reverse Recovery Time	t_{rr}		$I_F = 12A$, $dI_F/dt = 100A / \mu S$			13.3		nS
Reverse Recovery Charge	Q_{rr}					5.2		nC

[1]Pulse test : Pulse Width $\leq 300\ \mu sec$, Duty Cycle $\leq 2\%$.
[2]Independent of operating temperature.

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Output Characteristics

ID, Drain-To-Source Current(A) vs VDS, Drain-To-Source Voltage(V)

VGS=10V
VGS=9V
VGS=8V
VGS=7V
VGS=6V
VGS=4.5V
VGS=3.5V
VGS=3V
VGS=2.5V
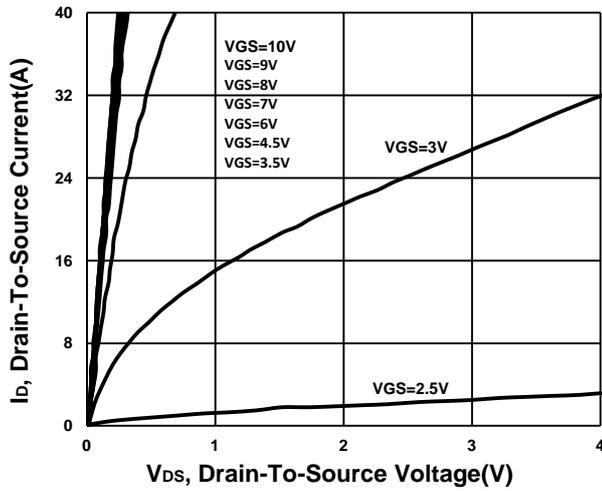
Transfer Characteristics

ID, Drain-To-Source Current(A) vs VGS, Gate-To-Source Voltage(V)

25℃
125℃
-20℃
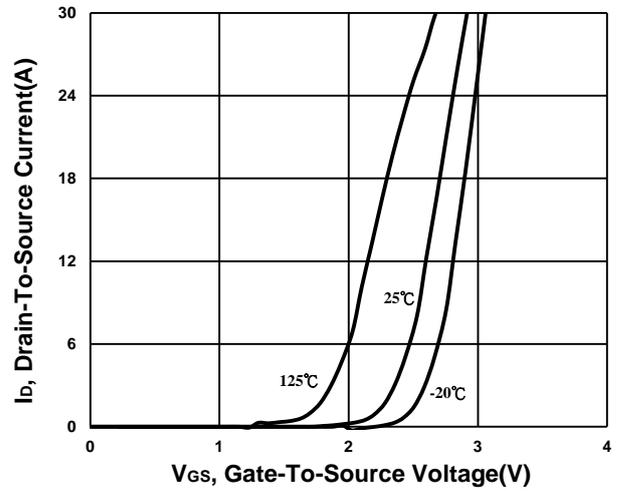
On-Resistance VS Temperature

Normalized Drain to Source ON-Resistance vs TJ, Junction Temperature(℃)

VGS=10V
ID=12A
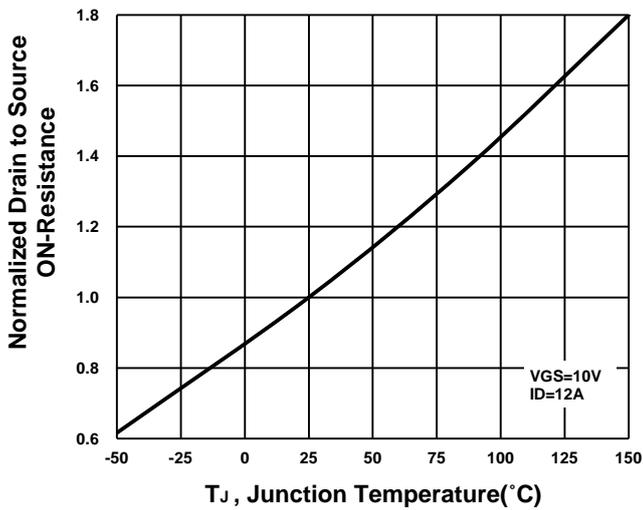
Capacitance Characteristic

C, Capacitance(pF) vs VDS, Drain-To-Source Voltage(V)

CISS
COSS
CRSS
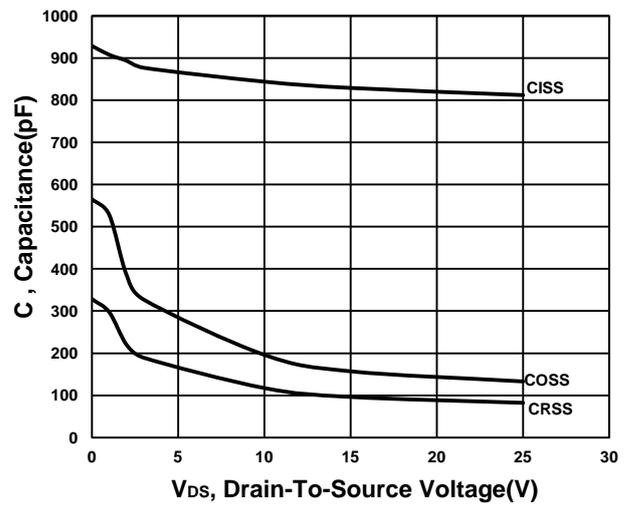
Gate charge Characteristics

VGS, Gate-To-Source Voltage(V) vs Qg, Total Gate Charge(nC)

V_{DS}=15V
I_D=12A
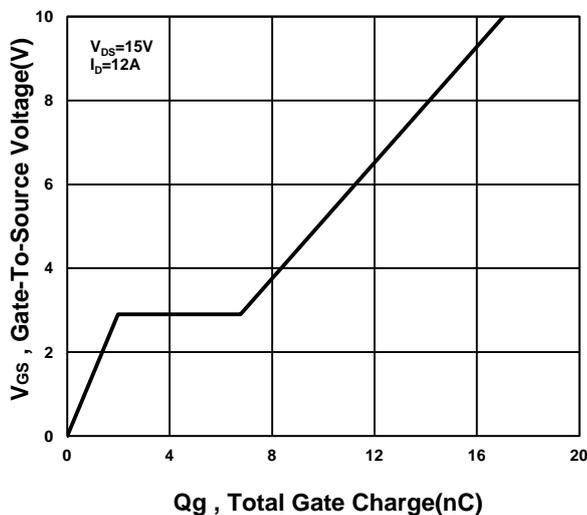
Source-Drain Diode Forward Voltage

Is, Source Current(A) vs VSD, Source-To-Drain Voltage(V)

150℃
25℃

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Safe Operating Area

Operation in This Area is Limited by RDS(ON)

I_D , Drain Current(A)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 10V
2.TA=25°C
3.RθJA = 75°C/W
4.Single Pulse

V_{DS}, Drain-To-Source Voltage(V)
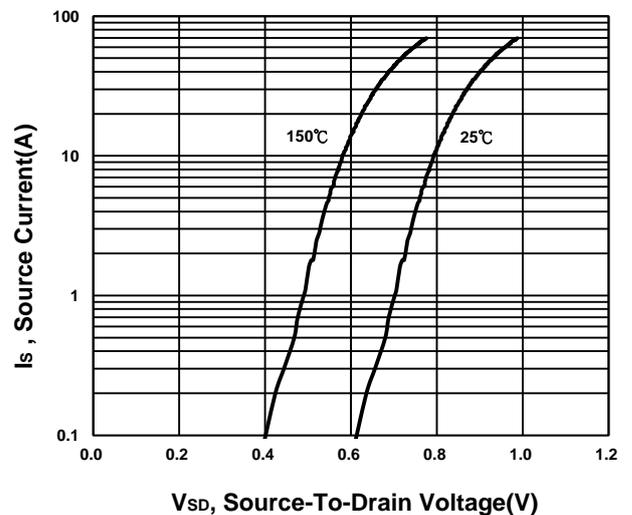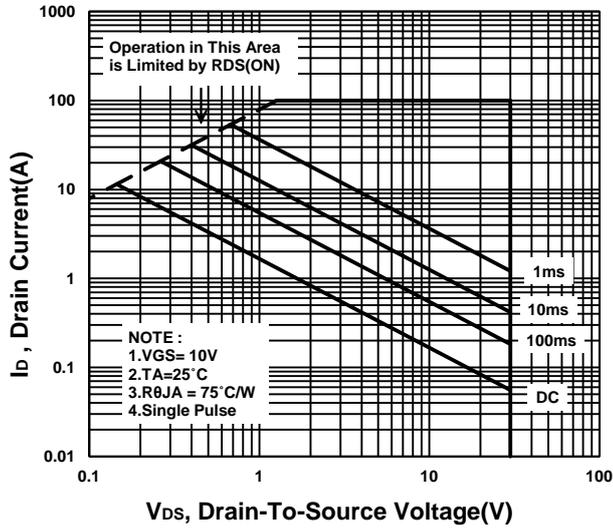
Single Pulse Maximum Power Dissipation

Single Pulse
RθJA = 75°C/W
TA=25°C

Power(W)

Single Pulse Time(s)
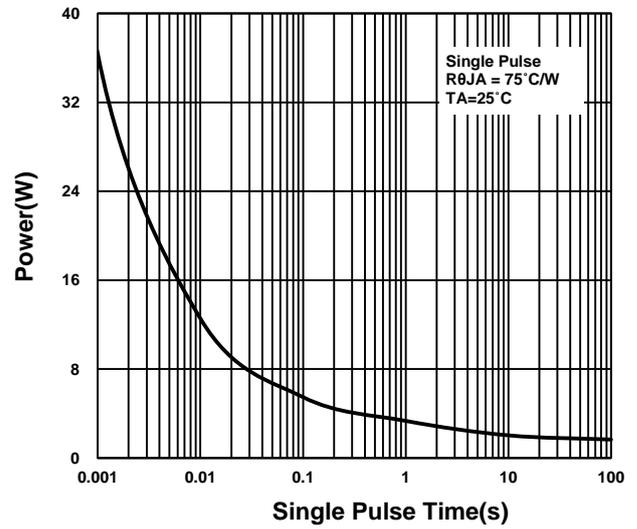
Transient Thermal Response Curve

r(t) , Normalized Effective Transient Thermal Resistance

Duty cycle=0.5
0.2
0.1
0.05
0.02
0.01
single pulse

Notes

P_{DM}
t1
t2

1.Duty cycle, D= t1 / t2
2.RthJA = 75 °C/W
3.TJ-TA = P*RthJA(t)
4.RthJA(t) = r(t)*RthJA

T_1 , Square Wave Pulse Duration[sec]
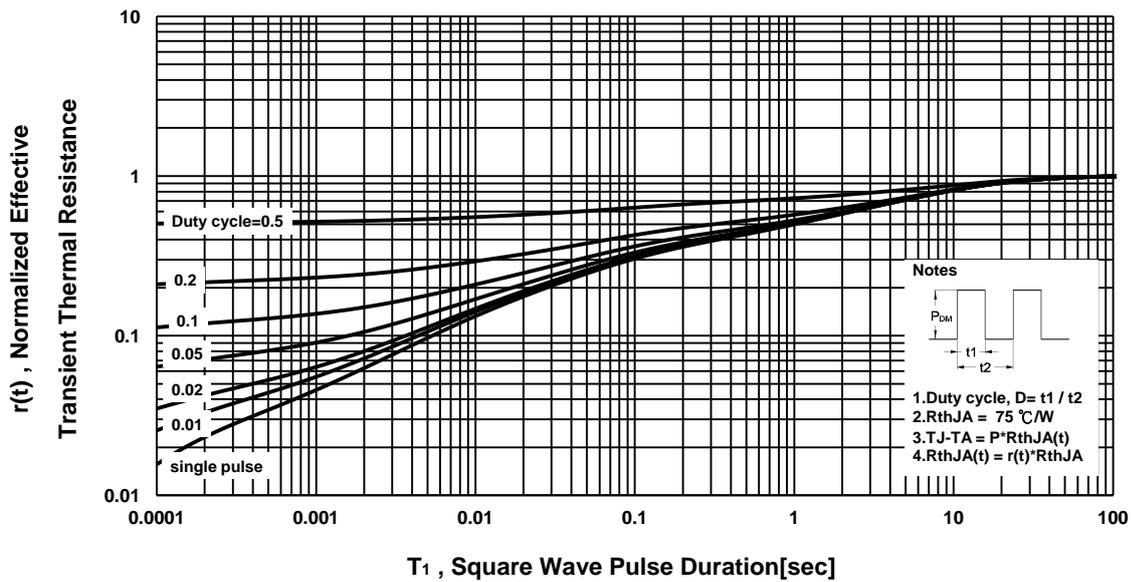
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